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Conclusions: The TIMI risk index provides excellent prediction of long-term mortality after hospitalization with primary UA, independent of other variables. Our findings extend the utility of this risk index to unselected patients with UA and to long-term risk prediction.

1072-105 Impact of Diabetes Mellitus on Long-Term Outcome After Non-ST-Elevation Acute Coronary Syndromes Treated With Very Early Revascularization

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Background: Limited information is available regarding the outcome of diabetic patients treated with very early revascularization for no-ST-elevation acute coronary syndromes (NSTACS). **Methods:** We conducted a prospective cohort study in 270 diabetics and 1163 nondiabetics with NSTACS undergoing coronary angiography and subsequent revascularization within 24 hours of admission. The primary endpoint was all-cause mortality and recorded for a mean of 20 months. **Results:** There were important differences in baseline characteristics. Most importantly, diabetics were older, and more often had previous myocardial infarction and three vessel disease as compared with nondiabetics. In addition, the NSTACS was more severe in diabetics, as cardiopulmonary resuscitation, ST-segment depression and raised Troponin T occurred more often in diabetics. Consequently, in-hospital (4.1% versus 1.3%, hazard ratio 3.47; 95% CI, 1.57 to 7.64; p=0.002) and long-term mortality (9.7% versus 4.9%, hazard ratio 2.11; 95% CI, 1.33 to 3.36; p=0.002) were significantly higher in diabetics. However, after adjustment for these differences in baseline characteristics, diabetes was no longer an independent predictor of long-term mortality (hazard ratio 1.43; 95% CI, 0.74 to 2.78; p=0.292). The prognostic impact of diabetes was different in women and men. **Conclusion:** Diabetic patients with NSTACS do have a higher in-hospital and long-term mortality due to their more advanced CAD and more severe NSTACS. However, very early revascularization seems to improve outcome in patients with diabetes and compensate for much of the extra risk factors present particular in diabetic women.

POSTER SESSION

1073 Advances in Transthoracic Defibrillation

Monday, March 31, 2003, 9:00 a.m.-11:00 a.m.
McCormick Place, Hall A
Presentation Hour: 9:00 a.m.-10:00 a.m.

1073-89 Escalating Energy Is More Effective Than Fixed Energy Defibrillation for Ischemically Induced Ventricular Fibrillation

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Background: Defibrillation, the principle challenge for out-of-hospital resuscitation, is best studied in clinically relevant models. Electrically induced VF in animals with characteristically low transthoracic impedance (TTI) (30-50Ω) is readily terminated by lower energy (150J) shocks. We hypothesized that a model of ischemic VF combined with TTI more typical of humans would require higher energy shocks for defibrillation. **Methods:** 18 anesthetized swine were randomized to fixed, low energy (150J) transthoracic shocks (Group 1, n=9) or escalating, higher energy (200-300-360J) shocks (Group 2, n=9). Thirty ohms were added in series to the measured TTI (obtained during a 30J shock while in sinus rhythm) of each pig. A multielectrode-tipped catheter was positioned in the coronary sinus for determination of electrical field strength (V/cm) produced by each transthoracic shock. VF was then induced by percutaneous balloon occlusion of a coronary artery. After 1 minute or 5 minutes of VF, countershocks with a biphasic truncated exponential waveform were administered at end-expiration using adhesive electrodes applied to the left and right lateral thorax. The primary endpoint was successful defibrillation with ≤3 shocks.

Results: The mean TTI was not different between the groups (Group 1, 82±11Ω; Group 2, 84±7 Ω), nor was the first shock peak current (Group 1, 18.1±1.2 A; Group 2, 20.3±0.1 A). Only one of the group 1 animals (11%) could be defibrillated with up to 3 shocks, each at 150 J. All Group 2 animals were successfully defibrillated. Eight of 9 group 2 animals were defibrillated with ≤ 2 shocks (p<0.001 vs Group1). The negative predictive value of a field strength of <10 V/cm was 100%.

Conclusions: In this ischemically induced VF animal model, 1. fixed, lower energy shocks were less effective than higher energies administered in an escalating dose protocol, 2. the effective energy dose for defibrillation was higher than that reported in electrically induced VF models, and 3. the electric field strength required for transthoracic defibrillation was greater than 10 V/cm and a value less than this was predictive of defibrillation failure.

1073-90 Comparison of Weight-Based Monophasic and Fixed-Sequence Biphasic Defibrillation Dosing for Resuscitation in a Model of Pediatric Prolonged Cardiac Arrest

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Background: Standard therapy for patients under 8 years old in ventricular fibrillation (VF) is to shock with a weight-based defibrillation dose. Since weight-based dosing is not feasible for automated external defibrillators (AEDs), it is important to learn if a single escalating energy sequence is effective over the weight range of children under 8.

Methods: After 7 minutes of untreated VF, 4, 14 and 24 kg piglets (10 of each weight) were randomized to receive monophasic 2,4,4 J/kg therapy (**M**) or a biphasic sequence of 50, 75, 86 J (**B**). Resuscitation was per peds BLS protocol to 20 minutes, then peds ALS protocol to 27 minutes. Endpoints 4-hr survival and 24-hr survival with good neurological outcome (cerebral performance category 1 or 2) were analyzed by Fisher's exact test; energy and number of shocks were analyzed by Student's t-test.

Results: Many more M than B shocks failed to defibrillate the first episode of VF (12 ± 7 vs. 2 ± 3 failed shocks, p<0.001) resulting in higher cumulative energy for M than B (59 ± 29 vs. 24 ± 24 J/kg, p=0.001). More B than M piglets survived to 4 hrs (15/15 vs. 7/15, p=0.002) and subsequently survived to 24 hours with good neuro scores (14/15 vs. 5/15, p=0.002). Most non-survivors had refractory VF.

Conclusions: This study showed that a single escalating biphasic dosing sequence consistently resuscitates piglets after prolonged VF, an important issue for pediatric AEDs. This therapy produced outcome superior to the recommended monophasic weight-based dosing over a wide weight range.

	4 kg Weight		14 kg Weight		24 kg Weight	
	M	B	M	B	M	B
Cumulative delivered energy, J/kg, mean ± sd	50 ± 19	**42 – 22**	40 ± 32	**21 – 28**	88 ± 6	**9 – 4**
# Failed shocks, 1st VF episode, mean ± sd	10 ± 6	**0.2 – 0.4**	8.6 ± 7.4	**3.4 – 5.5**	18 ± 2	**2 – 1.4**
4-hr survival	3/5	**5/5**	3/5	**5/5**	1/5	**5/5**
Good 24-hr neuro	2/5	**4/5**	3/5	**5/5**	0/5	**5/5**

1073-91 Detection and Discrimination Performance of an Automatic External Defibrillator in Ambulatory Patients During Treadmill Exercise

Thomas A. Mattioni, Sue Welch, Nabil Kanaan, Wendy Miller, Don Lin, Arizona Heart Institute, Phoenix, AZ, Cardiac Science, Inc., Irvine, CA

The Powerheart CRM (Cardiac Rhythm Monitor) is the next generation automatic external cardioverter defibrillator (AECD) designed for in-hospital use. This AECD has a programmable supraventricular/ventricular tachycardia (SVT/VT) discrimination algorithm designed to inhibit therapy delivery in the presence of SVT. This algorithm is also incorporated into the Powerheart AED (Automatic External Defibrillator) designed for out of hospital, first responder use. The present study was performed to assess algorithm performance in ambulatory patients.

A total of 50 participants (50 Males) in a cardiac rehabilitation program were attached to the AECD via externally applied adhesive electrode pads in the sternum-apex configuration. It was programmed to discriminate SVT from VT within a heart rate zone of 120 to 200 bpm in the advisory mode. Patients then walked on a conventional treadmill until limited by symptoms. Patients exercised for 7 to 15 minutes at a speed of 3.0 to 5.0 mph at 0 to 10 degrees grade. Only 22 patients achieved peak heart rates of greater than 120 bpm (mean peak heart rate 134 bpm). There were 4 episodes of artifact detection but no advice for therapy delivery in these 22 patients. There was one episode of recommended shock delivery at peak exercise at 7 minutes and heart rate of 106 bpm. This resulted in a specificity of 95.6%. In conclusion, this algorithm was very successful in rejecting artifact and discriminating SVT from VT during symptom-limited exertion and would be expected to perform very well in ambulatory patients.

1073-92 Hypothermia Facilitates Transthoracic Defibrillation

Benjamin J. Rhee, Yi Zhang, Loyd R. Davies, Richard E. Kerber, University of Iowa, Iowa City, IA

Background: Induced hypothermia (H) appears a promising intervention to protect the heart during and after resuscitation from cardiac arrest. However, the influence of H on defibrillation energy requirements is not well characterized. We studied the effect of body hypothermia on transthoracic defibrillation energy requirements, transthoracic impedence (TTI) and current using a swine model.

Methods: In 8 animals (21.4 ± 1.3(SE) kg) ventricular fibrillation (VF) was induced by delivery of 60 Hz AC current to the right ventricular apex. After 30 seconds of VF, the normothermic (N) swine were defibrillated (biphasic waveform) at 20J, 30J, 50J, and 100J. The swine were cooled to 30° C by surrounding the head, thorax, and abdomen with ice, and then underwent defibrillation at the same energies.

Results: Shock success in terminating VF was higher during H (p<0.001, odds ratio 3.98, 95% CI: 1.95, 8.12), despite the fact that TTI rose from 39 ± 3 (SD) ohms (N) to 42 ± 3 (SD) ohms (H) (p<0.001) and current fell from 22 ± 8 (N) to 21 ± 7 Amperes (H) (p<0.001). Post-defibrillation asystole occurred in 3 of 8 swine (N) vs. 0 of 8 (H) (p<0.05).